

C Programming through Arduino

G V V Sharma*

Problem 1. Connect the arduino to a seven segment display.

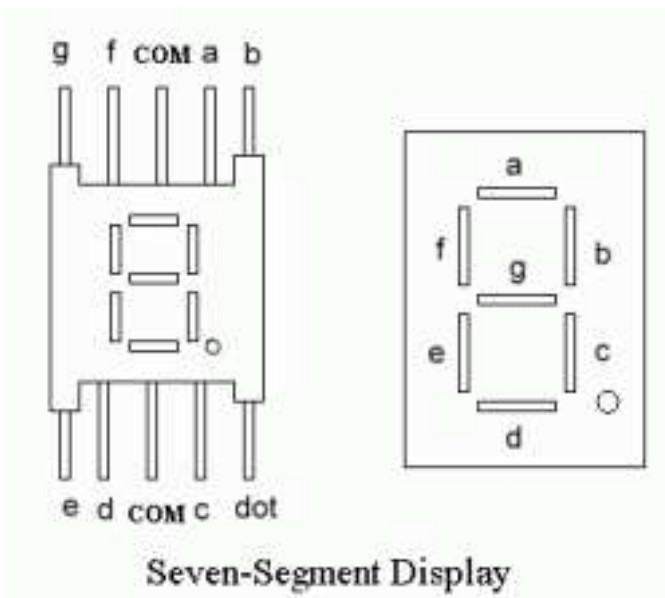


Fig. 1

Problem 2. Run the following program and test for dec=0 and dec=8.

```
//Code released under GNU GPL.
Free to use for anything.
//Remove the following line if you
are using the Arduino IDE
#include "Arduino.h"

int dec = 8;
void setup()
{
```

```
    // initialize LED digital pin as
    an output.
    pinMode(2, OUTPUT); // a
    pinMode(3, OUTPUT); // b
    pinMode(4, OUTPUT); // c
    pinMode(5, OUTPUT); // d
    pinMode(6, OUTPUT); // e
    pinMode(7, OUTPUT); // f
    pinMode(8, OUTPUT); // g
}

void loop ()
{
  if (dec==8)
  {
    digitalWrite(2,0);
    digitalWrite(3,0);
    digitalWrite(2,0);
    digitalWrite(5,0);
    digitalWrite(6,0);
    digitalWrite(7,0);
    digitalWrite(8,0);
  }
  else if (dec==0)
  {
    digitalWrite(2,0);
    digitalWrite(3,0);
    digitalWrite(2,0);
    digitalWrite(5,0);
    digitalWrite(6,0);
    digitalWrite(7,0);
    digitalWrite(8,1);
  }
}
```

*The author is with the Department of Electrical Engineering, Indian Institute of Technology, Hyderabad 502285 India e-mail: gadepall@iith.ac.in. All content in this manual is released under GNU GPL. Free and open source.

Problem 3. Extend the previous program for all numbers between 0-9. Print E on the display if the

input is not in this range.

Problem 4. Write a function for writing a decimal number to the seven segment display.

```
//Code released under GNU GPL.
  Free to use for anything.
//Remove the following line if you
  are using the Arduino IDE
#include "Arduino.h"

void sevensseg(int);
void setup()
{
  // initialize LED digital pin as
  an output.
  pinMode(2, OUTPUT); //a
  pinMode(3, OUTPUT); //b
  pinMode(4, OUTPUT); //c
  pinMode(5, OUTPUT); //d
  pinMode(6, OUTPUT); //e
  pinMode(7, OUTPUT); //f
  pinMode(8, OUTPUT); //g
}

void loop()
{
  sevensseg(0);
}

void sevensseg(int dec)
{
  int a=0,b=0,c=0,d=0,e=0,f
    =0,g=0;

  switch(dec)
  {
    case 0:
      g=1;
      break;
    case 1:
      a=1,d=1,e
        =1,f=1,g
        =1;
      break;
    case 2:
      c=1,f=1;
      break;
    case 3:
      e=1,f=1;
```

```
      break;
    case 4:
      a=1,d=1,e
        =1;
      break;
    case 5:
      b=1,e=1;
      break;
    case 6:
      b=1;
      break;
    case 7:
      d=1,e=1,f
        =1,g=1;
      break;
    case 8:
      break;
    case 9:
      e=1;
      break;
    default:
      b=1,c=1;
      break;
  }
  digitalWrite(2,a);
  digitalWrite(3,b);
  digitalWrite(4,c);
  digitalWrite(5,d);
  digitalWrite(6,e);
  digitalWrite(7,f);
  digitalWrite(8,g);
}
```

Problem 5. Using the function in problem 4 and a for loop, implement a decade counter.

```
//Code released under GNU GPL.
  Free to use for anything.
//Remove the following two lines
  if you are using the Arduino IDE
//and include the sevensseg
  function definition after the
  loop function
#include "Arduino.h"
#include "sevensseg.h"

int i;
void sevensseg(int);
void setup()
```

```

{
  // initialize LED digital pin as
  // an output.
  pinMode(2, OUTPUT); //a
  pinMode(3, OUTPUT); //b
  pinMode(4, OUTPUT); //c
  pinMode(5, OUTPUT); //d
  pinMode(6, OUTPUT); //e
  pinMode(7, OUTPUT); //f
  pinMode(8, OUTPUT); //g
}

void loop()
{
  for(i=0; i < 10; i++)
  {
    sevenseg(i);
    delay(1000);
  }
}

```

Problem 6. Repeat problem 4 using an array for pin numbering.

```

//Code released under GNU GPL.
  Free to use for anything.
//Remove the following line if you
  are using the Arduino IDE
#include "Arduino.h"

void sevenseg(int);
void setup()
{
  // initialize LED digital pin as
  // an output.
  pinMode(2, OUTPUT); //p[0]=a
  pinMode(3, OUTPUT); //p[1]=b
  pinMode(4, OUTPUT); //p[2]=c
  pinMode(5, OUTPUT); //p[3]=d
  pinMode(6, OUTPUT); //p[4]=e
  pinMode(7, OUTPUT); //p[5]=f
  pinMode(8, OUTPUT); //p[6]=g
}

void loop()
{
  sevenseg(0);

```

```

}
void sevenseg(int dec)
{
  int p[7],i;

  for (i=0;i < 7; i++)
    p[i] = 0;

  switch (dec)
  {
    case 0:
      p[6]=1;
      break;
    case 1:
      p[0]=1,p
      [3]=1,p
      [4]=1,p
      [5]=1,p
      [6]=1;
      break;
    case 2:
      p[2]=1,p
      [5]=1;
      break;
    case 3:
      p[4]=1,p
      [5]=1;
      break;
    case 4:
      p[0]=1,p
      [3]=1,p
      [4]=1;
      break;
    case 5:
      p[1]=1,p
      [4]=1;
      break;
    case 6:
      p[1]=1;
      break;
    case 7:
      p[3]=1,p
      [4]=1,p
      [5]=1,p
      [6]=1;
      break;
    case 8:
      break;
    case 9:

```

```

                p[4]=1;
                break;
        default:
                p[1]=1,p
                [2]=1;
                break;
    }

    for (i=0;i < 7; i++)
        digitalWrite(i+2,p
            [i]);
}

```

Problem 7. Repeat problem 2 by using the switch-case statements.

Problem 8. Repeat problem 5 by using a while loop.

Problem 9. Repeat 5 using a do-while loop.

Problem 10. Implement decimal to binary conversion and test your logic using the display.

```

//Code released under GNU GPL.
  Free to use for anything.
//Remove the following line if you
  are using the Arduino IDE
#include "Arduino.h"

void binsevensseg(int ,int ,int ,int );
void setup()
{
    int i;
    // initialize LED digital pin as
    an output.
    for (i=0;i < 7; i++)
        pinMode(i+2,
            OUTPUT);
}

void loop()
{
    int dec = 5;
    int E,F,G,H;

    //decimal to binary conversion
    E = dec%2;

```

```

dec = dec/2;
F = dec%2;
dec = dec/2;
G = dec%2;
dec = dec/2;
H = dec%2;

binsevensseg(E,F,G,H);
}
//function for binary to seven
  segment display
void binsevensseg(int A, int B, int
  C, int D)
{
    int p[7],i;

    p[0] = A&&!B&&!C&&!D || !A&&!B&&C
      &&!D;
    p[1] = A&&!B&&C&&!D || !A&&B&&C&&!
      D;
    p[2] = !A&&B&&!C&&!D;
    p[3] = A&&!B&&!C&&!D || !A&&!B&&C
      &&!D || A&&B&&C&&!D;
    p[4] = A&&!B&&!C&&!D || A&&B&&C
      &&!D || !A&&!B&&C&&!D || A&&!B&&
      C&&!D || A&&B&&C&&!D || A&&!B&&!
      C&&D;
    p[5] = A&&!B&&!C&&!D || !A&&B&&!C
      &&!D || A&&B&&!C&&!D || A&&B&&C
      &&!D;
    p[6] = !A&&!B&&!C&&!D || A&&!B&&!C
      &&!D || A&&B&&C&&!D;

    for (i=0;i < 7; i++)
        digitalWrite(i+2,p
            [i]);
}

```

Problem 11. Implement decimal to binary conversion using a for loop and arrays.

Problem 12. Repeat the above exercise using a while loop.

Problem 13. Repeat the above exercise using a do-while loop.

Problem 14. Repeat the above exercise by using a function.